

STUDIES ON SEED MYCOFLORA OF GREEN GRAM (*VIGNA RADIATA* L.) IN RAJASTHAN

KRATI SHARMA and TRIBHUWAN SINGH

Department of Botany, University of Rajasthan, Jaipur, 302004, Rajasthan, India.

400 seeds/sample of Green gram (*Vigna radiata* L.) (200 untreated and 200 treated with 1% sodium hypochlorite) from 118 seed samples from Rajasthan were drawn at random and incubated to detect the mycoflora. Seed borne mycoflora, their per cent incidence, pattern of fungal growth, its effect on germination, seedling symptoms and other deformities were recorded. A total of 44 fungi were recorded by these tests. The fungi commonly observed were species of *Alternaria*, *Aspergillus*, *Chaetomium*, *Curvularia*, *Drechslera*, *Penicillium*, *Fusarium* and *Rhizoctonia*.

Keywords : Incubation; Parasitic fungi; Saprophytic fungi.

Introduction

Green gram (*Vigna radiata* L) is a fast growing warm season dry land crop. Mung bean is supposed to be a native of India-Burma region of South East Asia. The important states producing green gram in India are Andhra Pradesh, Maharashtra, Punjab, Rajasthan and Uttar Pradesh. In Rajasthan it is predominantly grown in Ajmer, Barmer, Bhilwara, Churu, Jhunjhunu and Sikar districts. Green gram is grown mostly as kharif crop and also occasionally as rabi crop. Mung bean is an important pulse crop and host to many pathogens. The disease producing agents include fungi, bacteria and viruses which affects the production in various ways. As previous studies provide a little information on seed borne mycoflora in Rajasthan state, the present study was taken up.

Material and Methods

Incubation tests by standard blotter method were performed in all the 118 seed samples collected from 12 districts of Rajasthan. In standard blotter method 400 seeds/sample, 200 untreated and 200 pretreated with aqueous solution of sodium hypochlorite were tested. In the beginning several concentrations of sodium hypochlorite solution with 0.25, 0.5, 1.0 and 2.0% available chlorine for 1, 2, 3 and 5 min were tried. Pretreatment with 1% chlorine for 2 min was found to be the most suitable and used throughout the experiment. 25 seeds/petriplate were spaced in sterilized petriplate (9cm dia) containing 3 well moistened blotters and incubated at 26±2°C under 12h of alternating cycles of artificial light from Phillips florescent tubes fitted at a distance of 60 cm apart and darkness for 7 days¹. Percentage of seed germination, seed borne mycoflora and their percentage

incidence were recorded on 8th day of incubation. Relative percent occurrence of different fungi were calculated by the formula.

$$R.P.O = \frac{\text{No. of Samples infected with a particular fungi}}{\text{Total no. of Samples}} \times 100$$

Results and Discussion

118 seed samples were tested by SBM method. A total of 44 saprophytic as well as parasitic fungi were recorded by these tests (Table 1 & 2). Fungal species recorded in SBM were *Actinomyces*, *Alternaria alternata* (Fr) Keissler, *A. brassicicola* (Schw.) Wilts, *A. chrysanthemi* Simmons and Crosier, *A. dianthicola* (Neergaard), *A. longissima* Deighton and Macgarvie, *A. raphani* Groves & Skolko, *Aspergillus candidus* Link ex Fries, *A. fumigatus* Fresenius, *A. flavus* Link ex Fries, *A. nidulans* (Eidam) Winter, *A. niger* Van Tiegh, *A. ochraceus* Wilhem, *A. sulphureus* (Fres.) Thom and Church, *Botrytis cinerea* Pers ex Fries, *Cephalosporium* sp., *Chaetomidium fimeti* (Fuck.) Zopf, *Chaetomium globosum* Kunze ex Fries, *C. spinosum* Chivers, *Cladosporium cladosporioides* (Fres.) Devries, *C. herbarum* (Pers.) Link ex S.F. Gray, *C. oxysporum* Berk & Curd, *Colletotrichum dematium* (Fr.) Grove, *Curvularia clavata* Jain, *C. lunata* (Wakker) Boedijn, *C. pallescens* Boedijn, *Drechslera halodes* (Drechsler) Subram & Jain, *D. rostrata* (Drechs.) Richardson & Freser, *Epicoccum purpurascens* Ehrenb. Ex Schlecht, *Fusarium culmorum* (W.G. Smith) sacc., *F. equiseti* (Corda) Sacc, *F. moniliforme* Sheldon, *F. oxysporum* Schiecht ex Fr., *F. solani* (Mart.) Sacc, *Gliomastix* sp., *Memmoniella echinata* (Rivolta) Galloway, *Myrothecium roridum* Tode ex Fr., *Paezilomyces*

Table 1. Incidence, relative percent occurrence and percent range of important fungi in untreated mungbean seed samples of various districts of Rajasthan.

Fungi	Ajmer	Alwar	Bharatpur	Bikaner	Bundi	Churu	Dausa	Jaipur	Jhunjhunu	Nagaur	Sikar	Tonk	Total	RPO	% Range of fungi
<i>Actinomyces</i>	4	-	7	-	7	2	-	-	4	2	1	2	29	24.57	1-20
<i>Alternaria alternata</i>	4	4	8	2	7	7	3	13	15	-	4	6	73	61.86	1-56
<i>A brassicicola</i>	-	-	2	4	-	-	-	-	-	-	-	-	6	05.08	1-2
<i>A longissima</i>	-	-	2	-	-	-	-	-	2	-	-	-	4	03.38	1-3
<i>Aspergillus candidus</i>	5	-	5	1	4	6	-	4	6	1	-	-	32	27.11	1-8
<i>A. flavus</i>	6	2	8	3	10	4	2	13	11	1	5	1	66	55.93	1-44
<i>A. niger</i>	5	2	6	4	9	4	1	11	8	1	2	2	55	46.61	1-37
<i>Chaetomium globosum</i>	-	-	-	-	2	3	-	-	2	-	-	1	8	06.77	1-3
<i>Cladosporium cladosporioides</i>	1	1	-	2	-	-	-	-	11	-	2	1	18	15.25	1-33
<i>Colletotrichum dematium</i>	2	-	-	1	1	-	-	-	1	-	-	1	6	05.08	1-5
<i>Curvularia lunata</i>	4	1	6	3	8	2	-	4	7	1	2	1	39	33.05	1-29.5
<i>C. pallescens</i>	-	-	2	-	-	-	-	7	3	-	1	-	13	11.01	1-6
<i>Drechslera halodes</i>	1	-	6	2	2	1	1	7	11	-	-	1	25	21.18	1-14.5
<i>Fusarium moniliforme</i>	4	-	-	1	2	2	-	-	4	-	-	1	11	09.32	1-20
<i>F. oxysporum</i>	4	1	9	3	7	4	1	3	6	2	3	4	47	39.83	1-59
<i>Penicillium</i> spp.	2	1	6	1	6	1	-	-	3	1	1	-	22	18.64	1-12
<i>Rhizoctonia bataticola</i>	1	2	4	2	8	2	2	2	4	1	1	-	27	22.88	1-38
<i>Rhizopus nigricans</i>	1	-	4	1	2	3	-	2	5	2	1	2	23	19.94	1-15
<i>Stachybotrys parvispora</i>	2	1	-	1	3	-	-	-	3	-	-	-	9	07.62	1-4
<i>Trichothecium roseum</i>	1	-	3	1	1	-	1	-	-	-	1	2	10	08.47	1-12
<i>Verticillium albo-atrum</i>	1	1	-	1	2	1	-	-	1	-	-	-	7	05.93	1-5

Table 2. Incidence, relative percent occurrence and percent range of fungi in chlorine pre-treated mungbean seeds.

Fungi	SBM		
	Incidence	RPO	% Range of fungi
<i>Actinomycetes</i>	20	16.94	1-11
<i>Alternaria alternata</i>	68	57.62	1-38
<i>A. longissima</i>	06	05.08	1-3
<i>Aspergillus candidus</i>	29	24.57	1-10
<i>A. flavus</i>	55	46.61	1-35
<i>A. nidulans</i>	-	-	-
<i>A. niger</i>	44	37.28	1-24
<i>Cercospora</i> sp.	-	-	-
<i>Chaetomium globosum</i>	01	00.84	2
<i>Cladosporium cladosporioides</i>	16	13.55	1-37
<i>Colletotrichum dematium</i>	07	05.93	1-5
<i>Curvularia lunata</i>	24	20.33	1-15
<i>C. pallescens</i>	10	08.47	1-3
<i>Drechslera halodes</i>	13	11.01	1-12
<i>D. tetramera</i>	-	-	-
<i>Fusarium culmorum</i>	01	00.84	4
<i>Fusarium moniliforme</i>	11	09.32	1-10
<i>F. oxysporum</i>	47	39.83	1-63
<i>Nigrospora oryzae</i>	-	-	-
<i>Penicillium</i> spp.	09	07.62	1-8
<i>Phoma betae</i>	-	-	-
<i>Rhizoctonia bataticola</i>	34	28.81	1-40
<i>Rhizopus nigricans</i>	09	07.62	1-6
<i>Sclerotinia sclerotiorum</i>	-	-	-
<i>Stachybotrys parvispora</i>	01	00.84	2
<i>Trichothecium roseum</i>	09	07.62	1-12
<i>Verticillium alboatrum</i>	04	03.38	1-5

fusiformis (Saxena), *Penicillium* sp., *Rhizoctonia bataticola* (Taud.) Butler, *Rhizopus nigricans* Ehrenb., *Stachybotrys parvispora* Hughes, *Trichothecium roseum* Link ex Fr., and *Verticillium alboatrum* Rainke and Berthhold.

During incubation studies 44 fungal spp. belonging to 22 genera were found. This is the largest number of fungi recorded for the first time in the study on seed borne mycoflora of mung bean and could be attributed to the inclusions of a large number of representative samples of seeds of the crop. Saxena and Gupta² isolated 4 fungi as seed borne in nature while Saxena and Sinha³ reported 18 fungal spp. associated with *V. radiata*. Gupta and Gupta⁴ isolated a total of 34 fungi from stored seeds. Only 8 fungal spp. were isolated from *V. radiata* by Saxena⁵. Thakur *et al.*⁶ isolated 18 fungi in *V. radiata* samples from different localities of Madhya Pradesh. Charjan and Tarar⁷ isolated 6 fungi in seeds with insect damage. Of the total fungi recorded in the present study,

Actinomycetes, *Alternaria alternata*, *Curvularia lunata*, *Drechslera halodes*, *Fusarium oxysporum* and *Rhizoctonia bataticola* are important and showed high percentage of occurrence in Rajasthan. They are also known to cause various diseases in mung bean. High humidity and temperature during rainy season might favor the development of disease leading to heavy infection in these districts. Seed samples of Churu and Bikaner (relatively drier districts of Rajasthan) also yielded high percentage of fungal infection. *Rhizoctonia bataticola* and *Fusarium oxysporum* are the major pathogens of the crop in the state. 27 and 47 samples were infected with *R. bataticola* and *F. oxysporum* showing 1-38% and 1-59% incidence, respectively. Their heavy infection suggests that both pathogens have wide spread occurrence in Rajasthan state.

References

1. Anonymous 1985, International rules for seed testing, International seed testing association. *Seed Sci. and*

- Technol.* 13 299-513
2. Saxena R M and Gupta J S 1979, Field fungi associated with seeds of *Vigna radiata* var. *mungo* Hepper and their persistence during storage. *Proc. Nat. Acad. Sci. India B.* 45 636-638.
 3. Saxena R M and Sinha S 1979, Field mycoflora in *Vigna radiata* (L.) Wilczek var. *radiata* and *Vigna mungo* in relation to pre-emergence and post-emergence mortalities. *Seed Res.* 7 159-164.
 4. Gupta P K and Gupta J S 1984, Storage deterioration of mungbean seeds by fungi. *Int. J. Tropical Plant Dis.* 2 169-173.
 5. Saxena R N 1986, Antagonism among seed mycoflora associated with green gram and black gram. *Indian J. Pl. Pathol.* 4 193-194.
 6. Thakur M P, Agarwal K C and Khare M N 1990, Study on seed borne fungi of mungbean. *Indian J. Pulse Res.* 3 56-60
 7. Charjan S K U and Tarar J L 1994, Viability, vigour and mycoflora changes in pulse beetle damaged seeds of green gram (*V. radiata* (L) Wilczek). *Proc. Nat. Acad. Sci. India* 64 95-98.